

## WHAT IS CLAIMED IS:

1. A transmission diffraction grating body comprising:
  - a base material being substantially transparent with respect to wavelength  $\lambda_1$  and having a refractive index  $n_0$ ;
  - another base material being substantially transparent with respect to wavelength  $\lambda_1$  and having a refractive index  $n_1$ , which is formed on the base material having a refractive index  $n_0$ ; and
  - a relief diffraction grating formed on the base material having a refractive index  $n_1$ ; wherein:
    - the refractive indexes  $n_1$  and  $n_0$  satisfy the following relationship:
$$n_1 > n_0.$$
2. The diffraction grating body according to claim 1, wherein the diffraction grating is formed of a concave portion and a convex portion having rectangular-shaped cross sections, and the level difference  $h$  between the concave portion and the convex portion satisfies the following relationship:
$$h = \lambda_1 / (n_1 - 1)$$
3. The diffraction grating body according to claim 1, wherein the refractive index  $n_1$  is 1.9 or more.
4. The diffraction grating body according to claim 1, wherein a material of the base material having the refractive index  $n_1$  is at least one material selected from the group consisting of  $Ta_2O_5$ ,  $TiO_2$ ,  $ZrO_2$ ,  $Nb_2O_5$ ,  $ZnS$ ,  $LiNbO_3$  and  $LiTaO_3$ .
5. The diffraction grating body according to claim 1, wherein the diffraction grating is formed of a concave portion and a convex portion having rectangular-shaped cross sections, and the film thickness of the base material having the refractive index  $n_1$  is the same as the level difference  $h$  between the concave portion and the convex portion.

6. The diffraction grating body according to claim 1, further comprising an anti-reflection film in the interface between the base material having a refractive index  $n_1$  and the air, and the interface between the base material 5 having the refractive index  $n_1$  and the base material having a refractive index  $n_0$ .

7. A transmission diffraction grating body, comprising a base material, and a relief diffraction grating formed on the base material, wherein the 10 diffraction grating body is formed of a single base material; and the refractive index  $n_1$  of the single base material is 1.9 or more.

8. The diffraction grating body according to claim 7, wherein the diffraction grating is formed of a concave portion and a convex portion having 15 rectangular-shaped cross sections, and the level difference  $h$  between the concave portion and the convex portion satisfies the following relationship:

$$h = \lambda_1 / (n_1 - 1)$$

20 and the difference in an optical path between the concave portion and the convex portion is set to correspond to one wavelength with respect to the wavelength  $\lambda_1$ .

9. The diffraction grating body according to claim 7, wherein a material 25 of the single base material is at least one material selected from the group consisting of  $Ta_2O_5$ ,  $TiO_2$ ,  $ZrO_2$ ,  $Nb_2O_5$ ,  $ZnS$ ,  $LiNbO_3$  and  $LiTaO_3$ .

10. A semiconductor laser apparatus provided with a diffraction grating body according to any one of claims 1 to 9, comprising:  
30 a semiconductor laser for emitting a light beam with wavelength  $\lambda_1$  and a light beam with wavelength  $\lambda_2$ ; and  
a photodetector for receiving the light beams emitted from the semiconductor laser and carrying out photoelectric conversion; wherein:  
the diffraction grating body receives the light beam with wavelength 35  $\lambda_2$  and transmits a main beam and generates sub-beams that are  $\pm$ first order diffracted light; and  
the diffraction grating body, the semiconductor laser and the

photodetector are integrated into one package.

11. An optical pick-up provided with a diffraction grating body according to any one of claims 1 to 9, comprising:

5 a first semiconductor laser light source for emitting a light beam with wavelength  $\lambda_1$ ;

a second semiconductor laser light source for emitting a light beam with wavelength  $\lambda_1$ ;

10 an optical system for receiving the light beam with wavelength  $\lambda_1$  and the light beam with wavelength  $\lambda_2$  and converging the light beam onto a microspot on the optical disk;

an optical system for receiving the light beam with wavelength  $\lambda_1$  and converging the light beam onto a microspot on the optical disk;

15 a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein

the diffraction grating body receives the light beam with wavelength  $\lambda_2$  and transmits a main beam and generates sub-beams that are  $\pm$ first order diffracted light.

20 12. The optical pick-up according to claim 11, wherein the photo detecting portion comprises a photo detecting portion PD0 for receiving a +first order diffracted light from the diffraction means, and a distance d1 between the center of the photo detecting portion PD0 and the light emitting spot of the first semiconductor laser light source and a distance d2 between the center of the photo detecting portion PD0 and the light emitting spot of the second semiconductor laser light source substantially satisfy the following relationship:

30  $\lambda_1 / \lambda_2 = d1/d2$ .

13. The optical pick-up according to claim 11, wherein the diffraction grating body, the semiconductor laser and the photodetector are integrated into one package.

35 14. An optical information apparatus provided with the optical pick-up according to claim 11, comprising:

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a focus control means with respect to an optical disk;  
a tracking control means; and  
an information signal detecting means; and further comprising:  
a moving means for moving the optical pick-up; and  
a rotation means for rotating the optical disk.